

NATIONAL AND INTERNATIONAL CONFERENCE ON EDUCATION “Shaping the Future of Education”

1 April 2026



SENTRAL
COLLEGE PENANG



Faculty of Education
Thaksin University
ISSN 1905-6923



National and International Conference “Shaping the Future of Education”

1 April 2026

Faculty of Education
Thaksin University
ISSN 1905-6923

PREFACE

The National and International Conference on “Shaping the Future of Education,” held on 1 April 2026, brings together educators, researchers, policymakers, and practitioners from diverse backgrounds to explore innovative approaches and emerging trends in education. In an era marked by rapid technological advancement, shifting societal needs, and global interconnectedness, education systems must continuously adapt to prepare learners for the challenges and opportunities of the future.

This conference serves as a platform for the exchange of knowledge, ideas, and best practices that contribute to the transformation of education across local and global contexts. The selected papers included in these proceedings reflect a wide range of perspectives, addressing key themes such as digital learning, educational equity, curriculum innovation, teacher development, and lifelong learning.

We extend our sincere appreciation to all authors for their valuable contributions, as well as to the reviewers and organizing committee for their dedication and commitment to maintaining the academic quality of this conference. Their collective efforts have ensured that these proceedings represent meaningful and impactful scholarly work.

It is our hope that the insights presented in this volume will inspire further research, foster collaboration, and support the ongoing development of education systems that are inclusive, resilient, and forward-looking.

Conference Organizing Committee
1 April 2026

DEVELOPMENT OF AN ACTIVITY-BASED LEARNING MODEL INTEGRATED WITH ARTIFICIAL INTELLIGENCE FOR PRE-SERVICE SOCIAL STUDIES TEACHERS

Wipada Phinla¹, Wipapan Phinla¹ *, Bachtiar, SS², Natcha Mahapoonyanont¹

¹Faculty of Education, Thaksin University, Thailand

²Indonesia Open University, Indonesia

Email: wipapan@tsu.ac.th (Corresponding author)

Abstract

This study aimed to develop an activity-based learning model integrated with artificial intelligence (AI) for pre-service social studies teachers. The study employed a research and development (R&D) approach comprising three phases: (1) contextual analysis through document analysis and stakeholder interviews, (2) model design and development based on constructivist learning theory and activity-based learning principles, and (3) expert review of the proposed model.

Data were collected using document analysis forms, semi-structured interview protocols with lecturers and students, and an expert evaluation form. The developed instructional model consists of five stages (EFASA Model): Engage and Prompt, Facilitate Interactive Learning, Analyze Data and Make Decisions, Summarize and Reflect, and Assess and Extend Learning. The model integrates activity-based learning with AI-supported tools to facilitate inquiry, data analysis, collaborative problem-solving, and reflective learning processes.

In addition, the model includes a social system that emphasizes collaboration and teacher facilitation, a support system that incorporates digital and AI-based resources, and assessment strategies aligned with analytical thinking and decision-making competencies. Expert review results suggest that the model demonstrates a high level of appropriateness, feasibility, utility, and consistency for use in social studies teacher education contexts.

The study contributes to instructional design by providing a structured and theory-informed model that integrates pedagogical and technological elements. The model offers a practical framework for designing learning environments that support higher-order thinking and reflective learning processes in pre-service teacher education.

Keywords

Activity-Based Learning; Artificial Intelligence in Education; Instructional Model Development; Social Studies Education; Pre-Service Teachers; Analytical Thinking; Decision-Making

1. Introduction

In the context of rapid technological advancement and increasing global complexity, education systems are expected to equip learners with competencies that extend beyond the acquisition of disciplinary knowledge. Among these, analytical thinking and decision-making have been identified as essential skills for navigating uncertain and dynamic environments. International frameworks such as those developed by the Organization for Economic Co-operation and Development emphasize the importance of transformative competencies, including the ability to analyze complex situations, evaluate evidence, and make informed decisions (OECD, 2019, 2024). Similarly, reports from the World Economic Forum highlight analytical thinking, problem-solving, and innovation as critical skills for future workforce readiness (World Economic Forum, 2023).

Large-scale international assessments, particularly the Program for International Student Assessment (PISA), further reinforce this shift toward competency-based learning by focusing on learners' ability to apply knowledge in real-world contexts. Recent PISA frameworks increasingly incorporate dimensions of higher-order thinking, including analytical reasoning and decision-making in authentic scenarios (OECD, 2024a, 2024b). Despite these policy directions, many educational practices continue to rely on teacher-centered approaches that prioritize content delivery and memorization, thereby limiting opportunities for learners to engage in higher-order thinking processes.

These challenges are particularly evident in social studies education. As a discipline concerned with understanding social systems, civic engagement, and real-world issues, social studies provide a meaningful context for developing analytical thinking and decision-making skills. Effective social studies instruction requires learners to examine multiple perspectives, evaluate evidence, and make reasoned judgments. However, existing instructional practices often remain content-driven and examination-oriented, which may constrain the development of these competencies.

To address these limitations, contemporary research has increasingly emphasized the use of active learning approaches, particularly activity-based learning (ABL). Grounded in constructivist learning theory, ABL encourages learners to construct knowledge through meaningful activities, inquiry, collaboration, and reflection. Previous studies suggest that such approaches can support engagement and may contribute to the development of higher-order thinking skills, including analytical reasoning and decision-making.

In parallel, the integration of Artificial Intelligence (AI) in education has emerged as a promising direction for enhancing teaching and learning processes. AI technologies offer opportunities for personalized learning, real-time feedback, data analysis, and simulation-based environments. In learning contexts that involve higher-order thinking, AI can function as a cognitive support tool, enabling learners to explore complex information, analyze patterns, and consider alternative solutions. However, despite its potential, the integration of AI into instructional design remains limited and is often not systematically aligned with pedagogical approaches.

In teacher education, particularly in the preparation of social studies teachers, the development of analytical thinking and decision-making skills is especially important. Pre-service teachers are expected not only to develop these competencies themselves but also to design learning experiences that foster such skills in their future classrooms. Nevertheless, existing instructional approaches in teacher education may not sufficiently integrate pedagogy, technology, and competency development in a coherent manner.

Given these challenges, there is a need for a structured instructional model that integrates activity-based learning with artificial intelligence to support the development of analytical thinking and decision-making skills. Such a model should provide clear learning processes, align instructional strategies with targeted competencies, and incorporate appropriate technological and assessment components.

Therefore, this study aims to develop an activity-based learning model integrated with artificial intelligence for pre-service social studies teachers. The study focuses on designing a

theoretically grounded and practically relevant instructional framework that can support higher-order thinking and reflective learning processes in teacher education contexts.

2. Literature Review

2.1 Analytical Thinking and Decision-Making in Contemporary Education

Analytical thinking and decision-making are widely recognized as essential competencies in contemporary education. These skills involve the ability to examine information systematically, identify relationships, evaluate evidence, and make reasoned judgments in complex and uncertain contexts (Facione, 2015). Within international policy frameworks, such competencies are emphasized as part of broader goals for preparing learners to function effectively in dynamic social and professional environments. For example, the Organization for Economic Co-operation and Development Learning Compass 2030 highlights the importance of transformative competencies, including the capacity to analyze situations and take responsible action (OECD, 2019, 2024).

Similarly, the Program for International Student Assessment (PISA) increasingly focuses on learners' ability to apply knowledge in real-world contexts, incorporating higher-order thinking processes such as analytical reasoning and decision-making (OECD, 2024a, 2024b). These developments reflect a shift from content-based instruction toward competency-based learning, where learners are expected not only to acquire knowledge but also to use it effectively.

From a cognitive perspective, analytical thinking and decision-making are closely interconnected. Analytical thinking provides the foundation for identifying relevant information and evaluating alternatives, while decision-making involves selecting appropriate actions based on evidence and reasoning. Research suggests that instructional approaches that promote active engagement, inquiry, and problem-solving may support the development of these competencies (Chen et al., 2024). However, in many educational contexts, these skills remain underdeveloped due to the continued dominance of teacher-centered practices.

2.2 Activity-Based Learning as a Pedagogical Approach

Activity-based learning (ABL) is a learner-centered approach grounded in constructivist theory, which posits that knowledge is constructed through active engagement with learning experiences (Piaget, 1970; Vygotsky, 1978). In ABL environments, learners participate in meaningful tasks such as inquiry, problem-solving, collaboration, and reflection, which may support deeper understanding and cognitive development.

Empirical research indicates that active learning approaches, including ABL, are associated with increased student engagement and improved learning outcomes, particularly in relation to higher-order thinking skills (Freeman et al., 2014; Prince, 2004). By engaging learners in authentic and contextualized activities, ABL provides opportunities for applying knowledge, evaluating alternatives, and making decisions.

Furthermore, ABL aligns with experiential learning theory, which emphasizes the role of experience in knowledge construction (Kolb, 1984). Through cycles of action and reflection, learners are able to connect theoretical concepts with practical situations. In social studies education, this approach is particularly relevant, as it allows learners to explore real-world issues, consider multiple perspectives, and develop reasoned judgments.

However, the effectiveness of ABL depends on the presence of structured instructional processes. Without clear guidance and sequencing, learning activities may lack coherence and fail to support intended learning outcomes. This highlights the need for instructional models that provide systematic frameworks for implementing ABL effectively.

2.3 Artificial Intelligence in Education

Artificial Intelligence (AI) has emerged as a significant development in educational technology, offering new possibilities for enhancing teaching and learning processes. AI applications in education include personalized learning systems, adaptive feedback mechanisms, data analytics, and simulation-based environments (Holmes et al., 2022).

In contexts involving higher-order thinking, AI may serve as a cognitive support tool that assists learners in analyzing information, identifying patterns, and exploring alternative solutions. For example, AI-supported systems can provide real-time feedback, recommend resources, and facilitate decision-making scenarios, thereby supporting engagement with complex tasks (Zawacki-Richter et al., 2019).

In addition, AI technologies may support collaborative learning by enabling communication, knowledge sharing, and group decision-making. However, despite these potentials, the integration of AI into instructional design remains uneven. Many applications focus on technological features rather than pedagogical alignment, which may limit their effectiveness in supporting meaningful learning.

Recent studies suggest that the effectiveness of AI in education depends on its integration with appropriate pedagogical approaches, particularly those that promote active and learner-centered processes (Luckin et al., 2016). Therefore, combining AI with activity-based learning represents a promising direction for instructional design.

2.4 Instructional Model Development

Instructional models provide systematic frameworks for organizing learning processes, guiding teaching practices, and aligning instructional activities with learning objectives. According to Joyce, Weil, and Calhoun (2015), instructional models define key components of teaching and learning, including phases, roles, interactions, and support systems.

Effective instructional models for higher-order thinking typically incorporate structured stages that guide learners through processes such as problem identification, information analysis, solution development, implementation, and evaluation. These stages reflect constructivist principles and may support the development of analytical thinking and decision-making skills.

Research in instructional design suggests that models integrating multiple pedagogical approaches—such as inquiry-based learning, problem-based learning, and project-based learning—may be more effective than single-method approaches (Hmelo-Silver, 2004; Bell, 2010). These approaches share common characteristics, including learner-centeredness, real-world relevance, and emphasis on critical thinking.

However, existing instructional models often lack integration with emerging technologies such as AI, and may not explicitly address decision-making processes. This limitation indicates a need for models that combine pedagogical strategies and technological tools within a coherent framework.

2.5 Social Studies Education and Higher-Order Thinking

Social studies education is inherently connected to the development of higher-order thinking skills, as it involves the study of complex social systems, civic issues, and real-world problems. Effective social studies instruction requires learners to analyze information, evaluate evidence, consider diverse perspectives, and make informed decisions.

Research suggests that instructional approaches emphasizing inquiry, discussion, and problem-solving may support the development of these competencies (Levstik & Barton, 2015). Approaches such as project-based learning and inquiry-based learning provide opportunities for learners to engage in authentic tasks and develop analytical and decision-making skills.

However, in many contexts, social studies instruction continues to emphasize content coverage and examination performance. This may limit opportunities for learners to engage in higher-order thinking processes. As a result, there is a need for instructional models that provide structured opportunities for developing these competencies within the discipline.

2.6 Synthesis and Research Gap

The literature reviewed in this study highlights several key points. First, analytical thinking and decision-making are essential competencies emphasized by global educational frameworks. Second, activity-based learning provides a strong pedagogical foundation for supporting these skills through active engagement and experiential learning. Third, artificial intelligence offers potential for enhancing learning processes through feedback, data analysis, and simulation.

However, despite these developments, there remains a lack of integrated instructional models that systematically combine activity-based learning with AI to support the development of analytical thinking and decision-making skills. Existing studies often address these elements separately, resulting in fragmented approaches that may not fully align pedagogy, technology, and targeted competencies.

Therefore, this study addresses this gap by developing an instructional model that integrates activity-based learning with artificial intelligence within a structured framework. The model aims to align pedagogical strategies, technological tools, and competency development in a coherent design suitable for social studies teacher education contexts.

Conceptual Framework

The conceptual framework of this study is grounded in the integration of pedagogical theory, technological support, and competency-based learning outcomes. It is designed to guide the development of an activity-based learning model integrated with artificial intelligence (AI) for pre-service social studies teachers.

At the macro level, the framework is informed by global educational priorities, as articulated by organizations such as the Organization for Economic Co-operation and Development and the World Economic Forum, which emphasize the importance of analytical thinking and decision-making as key competencies for the twenty-first century (OECD, 2019, 2024; World Economic Forum, 2023). These competencies serve as the primary learning goals of the model.

The pedagogical foundation of the framework is based on activity-based learning (ABL) and constructivist learning theory. ABL promotes active engagement, experiential learning, and collaboration, while constructivist theory emphasizes knowledge construction through interaction and reflection (Piaget, 1970; Vygotsky, 1978). Together, these approaches provide a theoretical basis for designing learning environments that support higher-order thinking.

To enhance these pedagogical processes, the framework incorporates an AI-supported learning environment. AI technologies are positioned as cognitive support tools that may facilitate data analysis, provide adaptive feedback, and enable simulation-based learning experiences. Rather than functioning as a standalone component, AI is integrated into the learning process to support inquiry, problem-solving, and decision-making activities.

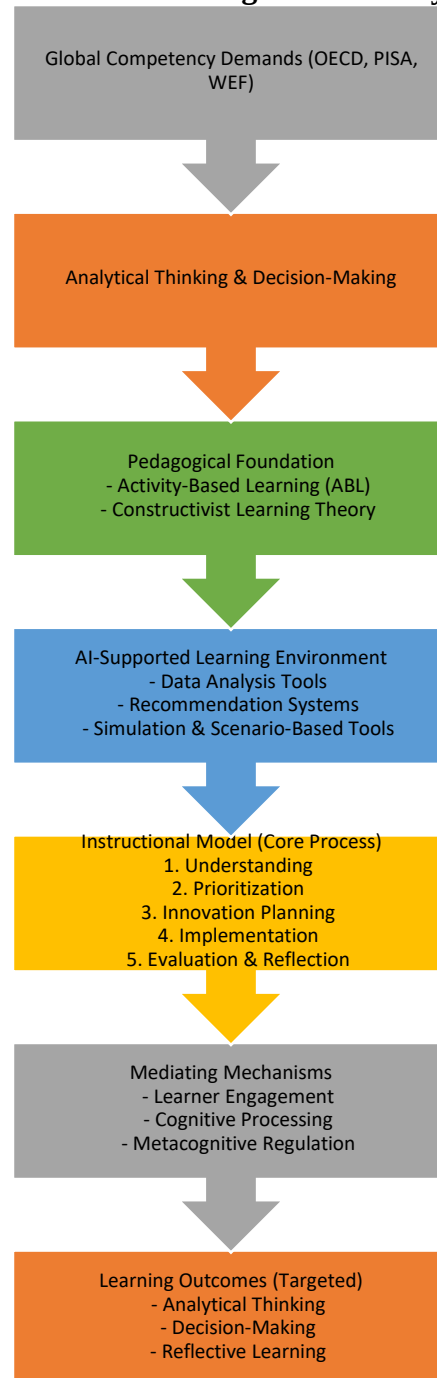
At the core of the framework is the instructional model, which consists of five sequential stages: (1) Understanding, where learners explore and define problems; (2) Prioritization, where key issues are identified and analyzed; (3) Innovation Planning, where learners develop potential solutions; (4) Implementation, where solutions are applied in simulated or real contexts; and (5) Evaluation and Reflection, where learners assess outcomes and reflect on their learning processes. These stages provide a structured pathway that aligns learning activities with targeted competencies.

The framework also includes mediating mechanisms that explain how the instructional model may support learning outcomes. These mechanisms include learner engagement, cognitive processing, and metacognitive regulation. Through active participation, analysis, and reflection, learners are expected to develop deeper understanding and improved decision-making capabilities.

Finally, the framework identifies three primary learning outcomes: analytical thinking, decision-making, and reflective learning. These outcomes represent the intended competencies that the instructional model is designed to support.

Overall, the conceptual framework illustrates how the integration of activity-based learning and artificial intelligence within a structured instructional model may provide a coherent approach to supporting higher-order thinking in social studies teacher education.

Figure 1. Conceptual Framework of the AI-Integrated Activity-Based Learning Model



3. Methodology

3.1 Research Design

This study employed a research and development (R&D) approach to design and develop an activity-based learning model integrated with artificial intelligence (AI) for pre-service social studies teachers. The R&D approach is appropriate for studies that aim to produce educational innovations grounded in theory and practice, as it allows for systematic processes of analysis, design, development, and evaluation (Richey & Klein, 2007).

The study was conducted in three main phases: (1) analysis, (2) design and development, and (3) evaluation. These phases were designed to ensure that the instructional model is theoretically grounded, contextually relevant, and practically applicable.

3.2 Research Phases

Phase 1: Analysis

The analysis phase aimed to identify the contextual needs and theoretical foundations for the development of the instructional model.

- **Document Analysis**
Relevant literature, policy documents, and curriculum frameworks related to analytical thinking, decision-making, activity-based learning, and artificial intelligence in education were reviewed. This process provided a theoretical basis for the model components.
- **Needs Analysis**
Semi-structured interviews were conducted with lecturers and pre-service teachers in social studies education to explore current instructional practices, challenges, and learning needs. The data were used to identify gaps between existing practices and desired competencies.

Phase 2: Design and Development

Based on the findings from the analysis phase, the instructional model was designed and developed.

- **Model Design**
The model was constructed by integrating principles of activity-based learning, constructivist learning theory, and AI-supported learning environments. The design process focused on aligning learning activities with analytical thinking and decision-making competencies.
- **Model Structure**
The developed instructional model consists of five stages:
 1. Understanding
 2. Prioritization
 3. Innovation Planning
 4. Implementation
 5. Evaluation and Reflection

In addition to the instructional process, the model includes key components such as the social system, support system, and assessment strategies.

- **Model Refinement**
The initial model was reviewed and revised based on feedback from the analysis phase and alignment with theoretical frameworks.

Phase 3: Evaluation

The evaluation phase focused on examining the appropriateness and quality of the developed instructional model.

- **Expert Review**
The model was evaluated by five experts in curriculum and instruction, social studies education, and educational technology. The experts were selected using purposive sampling based on their academic qualifications and professional experience.
- **Evaluation Criteria**
The model was assessed based on four dimensions: utility, feasibility, propriety, and

accuracy, following the standards of the Joint Committee on Standards for Educational Evaluation.

- Revision
Feedback from experts was used to refine and finalize the instructional model.

3.3 Participants

The participants in this study consisted of two groups:

- Experts (n = 5)
Five experts in curriculum and instruction, social studies education, and educational technology participated in the evaluation of the instructional model.
- Pre-Service Teachers and Lecturers
Pre-service social studies teachers and lecturers participated in the needs analysis phase. These participants provided insights into current instructional practices and learning challenges in teacher education contexts.

3.4 Research Instruments

The study employed multiple instruments to collect both qualitative and quantitative data:

- Document Analysis Form
Used to systematically review relevant literature and policy documents.
- Semi-Structured Interview Protocol
Used to collect data from lecturers and pre-service teachers regarding instructional practices and learning needs.
- Model Evaluation Form
A Likert-scale questionnaire designed to assess the quality of the instructional model based on the four evaluation criteria (utility, feasibility, propriety, and accuracy). The instrument also included open-ended questions for qualitative feedback.

3.5 Data Collection

Data were collected in accordance with the research phases:

- Literature and documents were collected and analyzed during the analysis phase
- Interviews were conducted with lecturers and pre-service teachers
- The developed model was presented to experts for evaluation

All data collection procedures were conducted with attention to ethical considerations, including voluntary participation and confidentiality.

3.6 Data Analysis

Data analysis in this study involved both qualitative and quantitative methods:

- Content Analysis
Qualitative data from document analysis and interviews were analyzed using content analysis to identify themes and inform model development (Krippendorff, 2018).
- Descriptive Statistics
Quantitative data from the model evaluation form were analyzed using mean (M) and standard deviation (SD) to determine the level of agreement among experts.

4. Results

4.1 Results of Instructional Model Development

The results of this study indicate that the developed instructional model is an **activity-based learning management model integrated with Artificial Intelligence (AI)** designed to enhance analytical thinking and decision-making skills among third-year Social Studies students at Thaksin University.

The model was developed through a systematic Research and Development (R&D) process, incorporating findings from document analysis, instructor interviews, and student interviews, which were used as baseline data for model construction .

4.1.1 Structure of the Instructional Model

The developed model consists of five main stages (EFASA Model), as follows:

1. **Engage and Prompt with Guiding Questions**

The instructor uses AI-supported media (e.g., chatbots or simulated scenarios) to stimulate learners' interest and pose open-ended questions to activate analytical thinking.

2. **Facilitate Interactive Activity-Based Learning**

Learners participate in collaborative group activities supported by AI tools (e.g., ChatGPT, Copilot), enabling inquiry, discussion, and knowledge co-construction.

3. **Analyze Data and Make Decisions**

Learners use AI tools to analyze data generated from learning activities (e.g., visualizations or simulations) and engage in evidence-based discussion and decision-making.

4. **Summarize and Reflect on Learning Outcomes**

Learners and instructors collaboratively reflect on learning processes and outcomes, with AI supporting knowledge synthesis (e.g., mind mapping or automated summaries).

5. **Assess and Extend Learning**

Learners complete AI-supported assessments with automated feedback and propose further learning extensions using AI tools .

4.1.2 Components Supporting the Model

In addition to the instructional process, the model includes key components:

- **Social System:** Emphasizes interaction between learners and instructors, as well as collaborative learning among peers
- **Support System:** Includes AI tools, digital learning media, and online assessment platforms
- **Assessment System:** Focuses on authentic assessment through observation, worksheets, and AI-supported testing

The lesson plans developed under this model are structured yet flexible, allowing instructors to adapt content, media, and activities according to context while maintaining the integrity of the instructional process .

4.2 Results of Learning Activity Design and Implementation

The developed instructional model was implemented through lesson plans in the course *Teaching Specific Subject*, covering multiple content areas such as Social Studies foundations, instructional design, economics, history, and geography.

The learning activities across all units followed the same five-stage process and demonstrated the following characteristics:

- Integration of AI tools for group formation, data analysis, and learning support
- Use of real-life scenarios (e.g., consumer decisions, social issues) to stimulate analytical thinking
- Emphasis on collaborative learning and discussion
- Application of AI-supported reflection and knowledge synthesis tools
- Use of AI-based assessment platforms with automated feedback

These activities were designed to promote systematic thinking, evidence-based reasoning, and real-world application of knowledge .

4.3 Results of Research Instruments Development

The study also resulted in the development of research instruments used to evaluate the instructional model. These include:

4.3.1 Student Satisfaction Questionnaire

A satisfaction questionnaire was developed to assess learners' perceptions of the instructional model across five dimensions:

1. Content
2. Learning Activities
3. Instructional Media and Resources
4. Measurement and Evaluation
5. Perceived Benefits

The instrument uses a five-point Likert scale and includes both close-ended and open-ended questions to capture learners' experiences and reflections .

4.3.2 Interview Instruments

Two types of interview protocols were developed:

- **Instructor Interview Protocol**
Focuses on instructional practices, integration of AI, challenges, and assessment strategies in promoting analytical thinking and decision-making
- **Student Interview Protocol**
Focuses on learning experiences, perceived problems, and expectations regarding AI-integrated activity-based learning

4.3.3 Document Analysis Forms

Document analysis instruments were developed to examine:

- Existing conditions and expected conditions of AI-integrated learning
- Approaches for enhancing analytical thinking and decision-making skills

These instruments were used as foundational data for designing the instructional model .

4.4 Summary of Results

The findings of this study indicate that:

1. The instructional model was successfully developed through a systematic R&D process based on empirical and theoretical foundations.
2. The model consists of a clearly structured five-stage learning process (EFASA Model) integrated with AI tools.
3. The model includes comprehensive components, including instructional processes, social systems, support systems, and assessment systems.
4. Learning activities were designed to promote analytical thinking and decision-making through real-world contexts and AI-supported learning environments.
5. Multiple research instruments were developed to support the evaluation of the instructional model.

Overall, the results demonstrate that the developed model provides a structured and theoretically grounded framework for organizing AI-integrated activity-based learning in higher education contexts.

5. Discussion

5.1 Integration of Learning Theories with AI-Enhanced Activity-Based Learning

The findings of this study demonstrate that the developed instructional model is strongly grounded in established learning theories while extending them through the integration of Artificial Intelligence (AI). The five-stage instructional process (EFASA Model) reflects key principles of **constructivist learning theory**, where learners actively construct knowledge through interaction, inquiry, and reflection.

In particular, the stages of *Facilitate Interactive Learning* and *Analyze Data and Make Decisions* align with **social constructivism**, emphasizing collaborative knowledge construction and dialogue among learners. This is consistent with the model's design, which promotes group discussion, peer interaction, and the co-construction of meaning through AI-supported tools .

Moreover, the model reflects **social cognitive learning theory** (Bandura), as learners observe, interact, and regulate their learning through AI-mediated environments. AI tools function not only as cognitive supports but also as social mediators, enabling learners to engage in modeling, feedback exchange, and self-regulation processes.

The incorporation of **insight learning theory** is evident in the use of problem-based and scenario-based activities, where learners analyze complex situations and arrive at solutions through understanding relationships rather than rote memorization. This supports higher-order thinking and aligns with the study's objective of enhancing analytical thinking and decision-making skills.

Overall, the integration of AI extends traditional learning theories by providing dynamic, adaptive, and interactive environments that support deeper cognitive engagement and learner autonomy.

5.2 AI as a Catalyst for Analytical Thinking and Decision-Making

The results indicate that AI plays a critical role in enhancing learners' analytical thinking and decision-making processes. Within the instructional model, AI is not used merely as a technological tool but as an **intellectual partner** that supports multiple stages of learning.

First, AI facilitates **data analysis and visualization**, enabling learners to interpret complex information and identify patterns more effectively. This aligns with the *Analyze Data and Make Decisions* stage, where learners use AI tools to simulate outcomes and evaluate alternatives .

Second, AI supports **personalized and immediate feedback**, which enhances learners' ability to reflect on their thinking and improve decision-making processes. This is particularly evident in the *Assess and Extend Learning* stage, where AI-based assessment systems provide rapid feedback and learning recommendations.

Third, AI contributes to **authentic and real-world learning experiences** through simulated scenarios. By engaging with real-life contexts, learners develop the ability to apply knowledge in practical situations, thereby strengthening decision-making skills.

These findings are consistent with contemporary research suggesting that AI-enhanced learning environments improve learners' ability to analyze data, evaluate alternatives, and make evidence-based decisions. The present study extends this body of knowledge by demonstrating how AI can be systematically embedded within an instructional model to support higher-order cognitive skills.

5.3 Alignment with Assessment for Learning (AfL) Principles

A significant contribution of this study is the alignment of the instructional model with the principles of **Assessment for Learning (AfL)**. The model integrates assessment as an ongoing, formative process embedded within each stage of learning rather than as a separate or summative activity.

First, the use of **open-ended questioning** in the *Engage and Prompt* stage reflects AfL principles by eliciting learners' prior knowledge and promoting deeper thinking. These questions serve as diagnostic tools that guide subsequent instruction.

Second, the model emphasizes **continuous feedback**, particularly through AI-supported assessment systems. Learners receive immediate feedback on their performance, enabling them to adjust their learning strategies and improve their understanding in real time.

Third, **peer and self-assessment** are embedded in collaborative activities and reflective stages. During group discussions and reflection activities, learners evaluate their own reasoning and that of their peers, which aligns with AfL's emphasis on developing learners' metacognitive skills.

Fourth, the use of diverse assessment methods-including observation, worksheets, and AI-based testing-ensures that assessment is aligned with learning objectives and captures multiple dimensions of learning, including knowledge, skills, and attitudes .

Thus, the model operationalizes AfL principles in a technology-enhanced context, demonstrating how AI can strengthen formative assessment practices and support learner-centered evaluation.

5.4 Implications for Teaching and Learning in Higher Education

The findings of this study have several important implications for teaching and learning in higher education.

First, the study highlights the need to shift from **content-centered instruction to learner-centered, activity-based learning**. Traditional lecture-based approaches are insufficient for developing analytical thinking and decision-making skills, whereas activity-based learning provides opportunities for active engagement and knowledge construction.

Second, the integration of AI requires instructors to adopt new roles as **learning facilitators and designers of learning environments**. Rather than transmitting knowledge, instructors guide learners in using AI tools effectively, designing meaningful learning activities, and fostering critical thinking.

Third, the study underscores the importance of **digital and AI literacy** for both instructors and learners. Effective implementation of AI-integrated learning models depends on users' ability to interact with AI tools critically and responsibly.

Fourth, the model demonstrates the potential of AI to support **lifelong learning**, as learners develop skills in inquiry, analysis, and self-directed learning that extend beyond the classroom.

5.5 Limitations and Directions for Future Research

Despite its contributions, this study has several limitations.

First, the study focuses primarily on the development of the instructional model and the design of learning activities and instruments. Empirical validation of the model's effectiveness in improving analytical thinking and decision-making skills requires further investigation through experimental or quasi-experimental studies.

Second, the implementation context is limited to third-year Social Studies students at a single university, which may affect the generalizability of the findings.

Third, while AI tools were integrated into the instructional design, variations in access to technology and digital competencies among learners may influence the effectiveness of implementation.

Future research should therefore:

- Conduct **experimental studies** to measure the impact of the model on learning outcomes
- Explore the application of the model in different disciplines and educational levels
- Investigate the role of AI in supporting other higher-order skills, such as creativity and problem-solving
- Examine ethical considerations and challenges related to AI use in education

5.6 Conclusion of the Discussion

In conclusion, this study demonstrates that the integration of learning theories, AI technologies, and Assessment for Learning (AfL) principles can create a comprehensive instructional model that supports the development of analytical thinking and decision-making skills.

The findings suggest that AI-enhanced activity-based learning not only aligns with established educational theories but also extends them by providing adaptive, interactive, and data-driven learning environments. Furthermore, the integration of AfL principles ensures that assessment becomes an integral part of the learning process, promoting continuous improvement and learner autonomy.

This study contributes to the growing body of research on AI in education by offering a theoretically grounded and practically applicable model for higher education contexts.

6. Conclusion

This study aimed to develop an activity-based learning model integrated with Artificial Intelligence (AI) to support analytical thinking and decision-making skills among third-year Social Studies students. Using a research and development (R&D) approach, the study produced a structured instructional model grounded in theoretical and empirical foundations.

The findings indicate that the developed model consists of a five-stage instructional process (EFASA Model), including engaging learners through guiding questions, facilitating interactive activity-based learning, supporting data analysis and decision-making, promoting reflection, and integrating assessment with learning extension. The model also incorporates key components such as the social system, support system, and assessment system, which collectively provide a comprehensive framework for organizing learning activities.

In addition, the integration of AI within the instructional process enables the use of data analysis tools, simulation environments, and automated feedback systems, which may support learners' engagement, inquiry, and reflective thinking processes. The model aligns with principles of constructivist learning theory, activity-based learning, and Assessment for Learning (AfL), suggesting that it provides a coherent approach to designing learner-centered and technology-enhanced learning environments.

Overall, the results suggest that the developed instructional model offers a structured and theoretically grounded framework that can be applied in higher education contexts, particularly in social studies teacher education. The model may support the design of learning experiences that encourage analytical thinking, decision-making, and reflective learning processes.

Despite these contributions, this study focuses primarily on model development and design. Further research is needed to examine the implementation of the model in diverse educational contexts and to investigate its potential effects on student learning outcomes using empirical methods.

References

- Alabbasi, D., Al-Barakat, A., & Al-Hassan, O. (2025). The impact of thinking skills programs on students' creative thinking in primary education. *Thinking Skills and Creativity*, 47, 101281.
- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83(2), 39–43. <https://doi.org/10.1080/00098650903505415>
- Chen, J., Liu, C., & Gao, Y. (2024). Effects of cognitive-based creativity training on students' creative thinking: A longitudinal study. *Thinking Skills and Creativity*, 52, 101375. <https://doi.org/10.1016/j.tsc.2024.101375>
- Conrad, J., & Gallagher, M. (2024). Supporting inquiry-based learning in elementary social studies teacher education. *Journal of Social Studies Research*, 48(1), 45–58. <https://doi.org/10.1016/j.jssr.2023.06.002>
- de Jong, T., Lazonder, A. W., Pedaste, M., & Zacharia, Z. C. (2024). Inquiry-based learning: A synthesis of research on its effectiveness. *Educational Research Review*, 43, 100540.
- Dias-Oliveira, E., et al. (2024). Project-based learning and development of critical thinking and collaboration skills. *Thinking Skills and Creativity*, 51, 101360.
- D'Souza, N., & Cirone, B. (2025). Elementary students as historians: Inquiry-based history instruction. *Theory & Research in Social Education*, 53(1), 89–110.
- Facione, P. A. (2015). Critical thinking: What it is and why it counts. Insight Assessment.
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Fauzi, I., et al. (2025). Creative thinking in primary education: A systematic review and bibliometric analysis. *Thinking Skills and Creativity*, 48, 101310. <https://doi.org/10.1016/j.tsc.2024.101310>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235–266. <https://doi.org/10.1023/B:EDPR.0000034022.16470.f3>
- Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications*. Center for Curriculum Redesign.
- Joyce, B., Weil, M., & Calhoun, E. (2015). *Models of teaching* (9th ed.). Pearson.
- Kolb, D. A. (1984). *Experiential learning*. Prentice Hall.
- Levstik, L. S., & Barton, K. C. (2015). *Doing history: Investigating with children in elementary and middle schools* (5th ed.). Routledge.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.
- Marini, A., et al. (2025). Website-integrated project-based learning and student creativity. *Education and Information Technologies*, 30, 2345–2363. <https://doi.org/10.1007/s10639-024-12001-2>
- Nam, S., Kim, H., & Lee, J. (2026). Authentic assessment in social studies education: Measuring real-world competencies. *Journal of Curriculum Studies*, 58(2), 215–233. <https://doi.org/10.1080/00220272.2025.2345678>
- Organisation for Economic Co-operation and Development (OECD). (2019). *OECD learning compass 2030*. OECD Publishing.
- Organisation for Economic Co-operation and Development (OECD). (2024a). *PISA 2022 results: Learning outcomes*. OECD Publishing.

- Organisation for Economic Co-operation and Development (OECD). (2024b). *PISA 2022 creative thinking framework*. OECD Publishing.
- Organisation for Economic Co-operation and Development (OECD). (2024c). *PISA 2022 assessment and analytical framework*. OECD Publishing.
- Organisation for Economic Co-operation and Development (OECD). (2024d). *Future of education and skills 2030*. OECD Publishing.
- Piaget, J. (1970). *Science of education and the psychology of the child*. Orion Press.
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223–231.
- Puryear, J. S., & Lamb, K. N. (2024). Teachers' beliefs about creativity in education. *Thinking Skills and Creativity*, 50, 101345.
- Seawright, J., & Hayes, C. (2024). Inquiry-based social studies and place-based learning. *Theory & Research in Social Education*, 52(4), 567–589.
- Vygotsky, L. S. (1978). *Mind in society*. Harvard University Press.
- Wang, Y., et al. (2024). Effects of virtual technology on creativity: A meta-analysis. *Computers & Education*, 200, 104832.
- World Economic Forum. (2023). *The future of jobs report 2023*. World Economic Forum.
- Yang, Y., et al. (2025). Creativity-supportive teaching: A systematic review. *Review of Educational Research*, 95(1), 45–78.
- Zawacki-Richter, O., et al. (2019). Systematic review of AI in higher education. *International Journal of Educational Technology in Higher Education*, 16, 39. <https://doi.org/10.1186/s41239-019-0171-0>